

FIVE-YEAR REVIEW REPORT

**Five-Year Review Report
For
San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California**

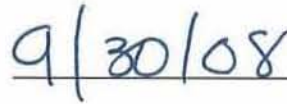
September 2008

Approved by:

A handwritten signature in blue ink, appearing to read "Kathleen Salyer", is written over a horizontal line.

**Kathleen Salyer, Assistant Director
California Site Cleanup Branch
Superfund Division
USEPA, Region 9**

Date:

A handwritten date "9/30/08" in blue ink is written over a horizontal line.

Contents

Section	Page
List of Acronyms	vii
Five-year Review Summary Form	ix
Executive Summary	ES-1
1.0 Introduction	1-1
2.0 Site Chronology	2-1
3.0 Site Background	3-1
3.1 Physical Characteristics	3-1
3.2 Land and Resource Use	3-1
3.3 History of Contamination	3-2
3.4 Initial Response	3-2
3.4.1 NHOU Initial Response	3-2
3.4.2 BOU Initial Response	3-2
3.5 Basis for Taking Action	3-3
4.0 Remedial Actions	4-1
4.1 Remedy Selection	4-1
4.1.1 North Hollywood Operable Unit	4-1
4.1.2 Burbank Operable Unit	4-1
4.2 Remedy Implementation	4-2
4.2.1 North Hollywood Operable Unit	4-2
4.2.2 Burbank Operable Unit	4-2
4.3 Operation and Maintenance	4-2
4.3.1 System Operation and Maintenance	4-2
5.0 Progress Since the Last Review	5-1
5.1 Previous Protectiveness Statements	5-1
5.1.1 North Hollywood	5-1
5.1.2 Burbank Operable Unit	5-1
5.2 Status of Issues and Recommendations	5-2
5.2.1 Burbank Operable Unit	5-3
6.0 Five-year Review Findings	6-1
6.1 Five-year Review Process	6-1
6.2 Community Notification and Involvement	6-1
6.3 Document Review	6-1
6.4 Data Review	6-1
6.4.1 Area 1 Groundwater Quality	6-1
6.4.2 Groundwater Extraction and Treatment Systems	6-3
6.4.3 Containment of Contaminated Groundwater	6-4
6.5 Site Inspection	6-6
6.6 Interviews	6-7
6.6.1 Technical Interviews	6-7

Contents, Continued

	Page
7.1 Question A: Is the remedy functioning as intended by the decision documents?.....	7-1
7.1.2 North Hollywood Operable Unit	7-1
7.1.3 Burbank Operable Unit.....	7-1
7.1.4 Institutional Controls for BHOu and NHOu.....	7-2
7.2 Question B: Are the exposure assumptions, toxicity data, cleanup levels and remedial action objectives used at the time of the remedy selection still valid?.....	7-3
7.3 Question C: Has any other information come to light that could call into question the protectiveness of the remedy?.....	7-4
7.3.1 North Hollywood Operable Unit	7-4
7.3.2 Burbank Operable Unit.....	7-4
7.4 Technical Assessment Summary	7-4
8.0 Issues and Recommendations	8-1
9.0 Protectiveness Statement.....	9-1
10.0 Next Review	10-1

Tables

2-1 Chronology of SFV (Area 1) Site Events.....	2-1
4-1 Operation and Maintenance Costs 2004 – 2007	4-4
4-2 Operation and Maintenance Costs 2004 – 2008	4-5
8-1 Issues and Recommendations for Area 1	8-1

Figures

1-1 Site Location Map	1-3
3-1 Location of Production and Extraction Wells	3-5
3-2 Location of Facility and Remedial Investigation Monitoring Wells.....	3-7
3-3 Chromium Concentration in Shallow Zone Groundwater	3-9
4-1 Schematic Diagram of NHOu and BOU Groundwater Treatment Facility	4-7
4-2 Photograph of NHOu and BOU Groundwater Treatment Facilities.....	4-9

Appendices

A Interim Technical Memorandums	
A-1 North Hollywood Operable Unit Status of Past Recommendations Technical Memorandum	
A-2 Burbank Operable Unit Status of Past Recommendations Technical Memorandum	
A-3 North Hollywood Operable Unit Applicable or Relevant and Appropriate Requirements Technical Memorandum	
A-4 Burbank Operable Unit Applicable or Relevant and Appropriate Requirements Technical Memorandum	

Contents, Continued

	Page
A-5	North Hollywood Operable Unit Data Review Technical Memorandum
A-6	Burbank Operable Unit Data Review Technical Memorandum
B	Documents Reviewed
C	Five-year Review Site Inspection Checklist and Interview Summary Forms
D	Site Inspection Photographs

List of Acronyms

ARAR	applicable or relevant and appropriate requirement
bgs	below ground surface
BOU	Burbank Operable Unit
CAO	Cleanup and Abatement Order
CDPH	California Department of Public Health
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
COC	constituent of concern
ESD	Explanation of Significant Differences
FFS	focused feasibility study
GAC	granular activated carbon
gpm	gallons per minute
Honeywell	Honeywell International Inc.
IC	institutional control
LADWP	Los Angeles Department of Water and Power
LPGAC	liquid-phase granular-activated carbon
MCL	maximum contaminant level
MWD	Metropolitan Water District
µg/L	micrograms per liter
mg/L	milligrams per liter
NDMA	N-nitrosodimethylamine
NHOU	North Hollywood Operable Unit
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
O&M	operation and maintenance
OEHHA	Office of Environmental Health Hazard Assessment
OU	Operable Unit

PCE	perchloroethene
PHG	public health goal
QA/QC	quality assurance / quality control
RI/FS	remedial investigation/feasibility study
ROD	Record of Decision
RWQCB	Regional Water Quality Control Board
SCAQMD	South Coast Air Quality Management District
SFV	San Fernando Valley
TCE	trichloroethene
TCP	trichloropropane
ULARA	Upper Los Angeles River Area
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound
VPAC	vapor-phase granular-activated carbon

Five-year Review Summary Form

SITE IDENTIFICATION

Site name : San Fernando Valley (Area 1) Superfund Site

EPA ID: CAD980894893

CERCLIS ID : 09N1 (North Hollywood Operable Unit [OU]) and 09L6 (Burbank OU)

Region: 9 **State:** CA **City/County:** Los Angeles / Los Angeles

SITE STATUS

NPL status: ☒ Final ☐ Deleted ☐ Other (specify) _____

Remediation status (choose all that apply): ☒ Operating ☐ Complete

Multiple OUs? ☒ YES ☐ NO **Construction completion date:** N/A

North Hollywood OU, Burbank OU

Has site been put into reuse? ☐ YES ☐ NO ☒ N/A This is a groundwater only site.

REVIEW STATUS

Reviewing agency: ☒ USEPA ☐ State ☐ Tribe ☐ Other Federal Agency _____

Author name: Rachel Loftin

Author title: Remedial Project Manager

Author affiliation: USEPA Region 9

Review period: March through September 2008

Date(s) of site inspection: April 24, 2008 (Burbank OU) and April 25, 2008 (North Hollywood OU)

Type of review: ☒ Statutory

☐ Policy

☐ Post-SARA ☐ Pre-SARA ☐ NPL-Removal only

☐ Non-NPL Remedial Action Site ☐ NPL State/Tribe-lead

☐ Regional Discretion)

Review number: ☐ 1 (first) ☒ 2 (Burbank OU) ☐ 3 (third) ☒ 4 (North Hollywood OU) ☐ Other (specify)

Triggering action:

- ☐ Actual RA Onsite Construction at OU ____
- ☐ Actual RA
- ☒ Previous Five-year Review Reports
- ☐ Construction Completion
- ☐ Other (specify)

Triggering action date: Previous Five-Year Reviews: September 2003 (North Hollywood OU) and September 2004 (Burbank OU)

Due date (five years after triggering action date): September 2008 (Areawide FYR).

Issues and Recommendations:

Issue

1. Some groundwater migration from areas with high levels of COCs to areas of lower levels or no contamination has occurred.
2. The treatment facility at NHOU cannot treat chromium, which has affected operation of at least one NHOU remedy extraction well

Recommendations

EPA should complete the NHOU Focused Feasibility Study and select remedy improvements in a new decision document.

Protectiveness Statement:

The remedy for the NHOU is protective of human health and the environment in the short-term because there is no exposure to untreated groundwater. The treatment system effluent contaminant concentrations are less than their regulatory cleanup goals. There are governmental controls in place that prevent exposure to untreated groundwater. However, to be protective in the long term, the treatment facility needs to be modified to treat chromium and the extraction system needs modifications to improve plume containment. EPA is completing a focused feasibility study to evaluate options for expanding and improving the performance of the NHOU remedy and expects to propose and later select a second interim remedy in 2009 that will enhance plume capture and add chromium treatment.

The remedy at the BOU is protective of human health and the environment because there is no exposure to untreated groundwater. The treatment system effluent contaminant concentrations are less than their regulatory cleanup goals. There are governmental controls in place that prevent exposure to untreated groundwater. The current extraction system is achieving the remedial action objective of partial containment.

Executive Summary

The U.S. Environmental Protection Agency Region 9 has conducted the second five-year review (FYR or "five-year review") of San Fernando Valley (SFV) Area 1 Superfund Site, in Los Angeles County, California. The purpose of this FYR is to determine whether the interim remedial actions implemented at the site are protective of human health and the environment. This FYR is required because hazardous substances remain on-site above the risk-based levels determined in the Records of Decision (RODs) that would allow for unlimited use and unrestricted exposure. The methods, findings, and conclusions of the review are documented in this report. In addition, this report summarizes issues identified during the review and includes recommendations and follow-up actions to address them.

The SFV Area 1 Site includes two operable units (OUs): North Hollywood and Burbank. This is the fourth five-year review report for the NHOU and the second five-year review report for the BOU (prior five-year reviews were conducted separately for each OU). The triggering actions for the SFV Area 1 Site five-year review are the dates of the previous NHOU and BOU five-year reviews (September 2003 and September 2004, respectively).

The Remedial Action Objective (RAO) presented in the North Hollywood OU interim Record of Decision was to "slow down or arrest" the migration of the groundwater contamination plume. The selected interim remedy at the Burbank OU was designed to achieve two objectives:

- To partially control the movement and spread of ground water contaminants in the Burbank OU area, while contributing to aquifer restoration at the SFV Area 1 Site.
- To address the public health threat posed by contamination of the City of Burbank's public water supply wells by providing residents in the area with a water supply that meets state and federal drinking water standards.

To address the above RAOs, pump and treat systems were selected as the interim remedies for both OUs. The groundwater treatment system started operations at North Hollywood OU in 1989 and at Burbank OU in 1996.

This five-year review found that the interim remedies were constructed in accordance with the requirements of the interim Records of Decision. Two Explanation of Significant Differences (ESDs) were issued at the Burbank OU to modify the treatment to allow blending in order to meet the nitrate standards, reduce the proposed capacity of the groundwater system from 12,000 gpm to 9,000 gpm, and to modify the end use of the treated groundwater. There are governmental controls in place that prevent exposure to untreated groundwater. The remedy at Burbank OU is operating as intended. However, the treatment facility at North Hollywood needs to be modified to treat chromium and the extraction system needs modifications to improve plume containment. EPA expects a decision document for a new remedy in 2009 that will enhance plume capture and add chromium treatment.

1.0 Introduction

The United States Environmental Protection Agency (USEPA) is conducting this five-year review of the remedial actions implemented at the San Fernando Valley (SFV) Area 1 Superfund Site (referred to hereafter as SFV Area 1 Site), in Los Angeles County, California.

The five-year review process in this case evaluates whether the interim remedies for the North Hollywood Operable Unit (NHOU) and the Burbank Operable Unit (BOU) of the SFV Area 1 Site remain protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in five-year review reports. In addition, five-year review reports identify issues found during the review and provide recommendations and proposed follow up actions.

This review is required by federal statute. USEPA must implement five-year reviews consistent with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the National Contingency Plan. CERCLA Section 121(c), as amended, states:

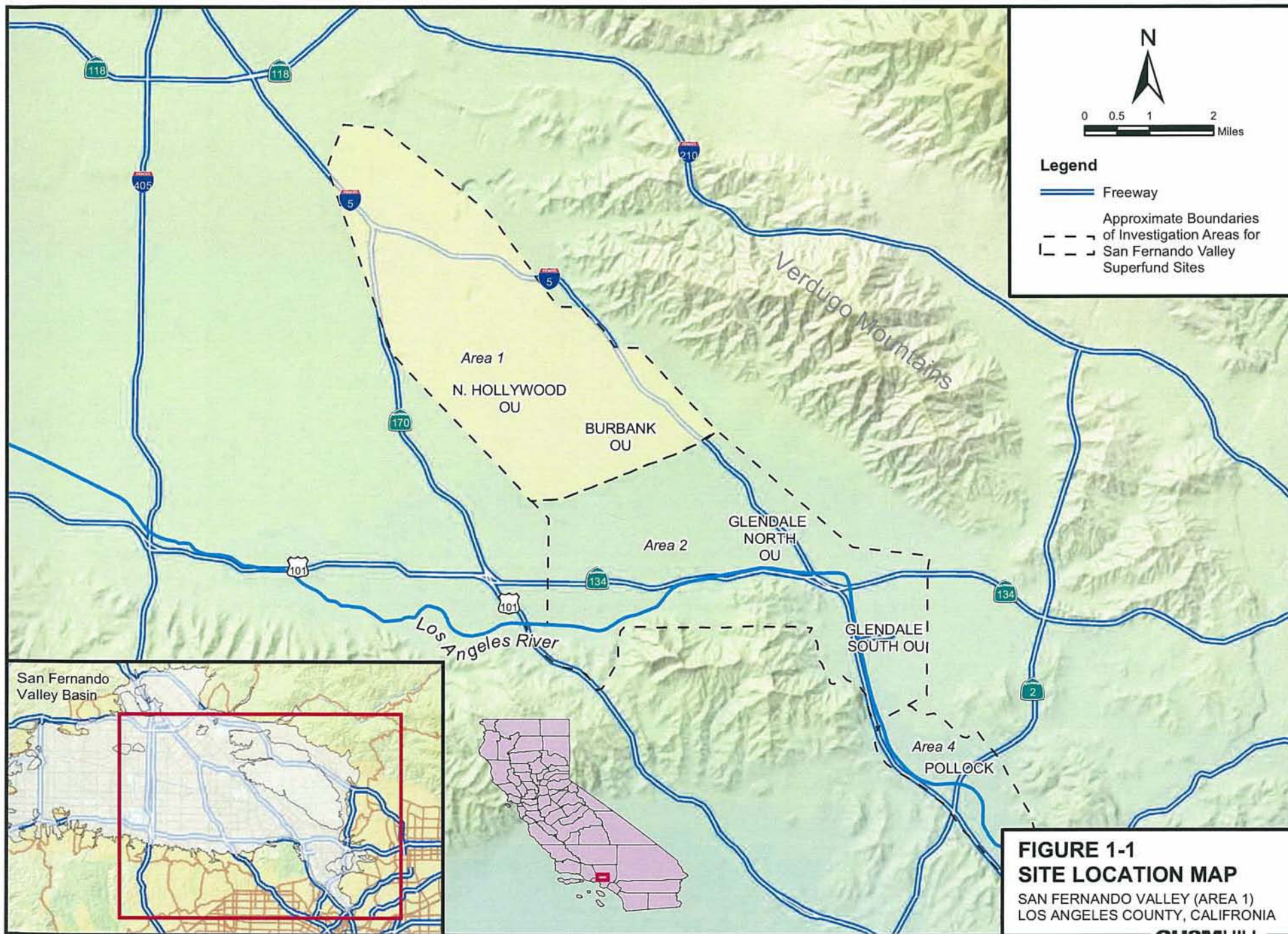
If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

The Agency interpreted this requirement further in the National Contingency Plan; 40 Code of Federal Regulations §300.430(f)(4)(ii) states:

If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

Consequently, this five-year review report has been completed because hazardous substances, pollutants, or contaminants remain at the NHOU and the BOU above levels that allow for unrestricted use and unlimited exposure.

The SFV Area 1 Site includes two operable units (OUs): North Hollywood and Burbank. This is the fourth five-year review report for the NHOU and the second five-year review report for the BOU (prior five-year reviews were conducted separately for each OU). The triggering actions for the SFV Area 1 Site five-year review are the dates of the previous NHOU and BOU five-year reviews (September 2003 and September 2004, respectively).



2.0 Site Chronology

Table 2-1 provides a chronology of events at the SFV (Area 1) Site.

TABLE 2-1
CHRONOLOGY OF SFV (AREA 1) SITE EVENTS
San Fernando Valley (Area 1) Superfund Site, Los Angeles County, California

Event	Date
CDPH (formerly DHS) detected trichloroethene (TCE), perchloroethene (PCE), and other volatile organic compounds (VOCs) in a large number of production wells exceeding respective maximum contaminant level (MCL) and/or state notification level; those wells removed from service. Alternative water supply obtained from the Metropolitan Water District (MWD) where needed.	1980
SFV Area 1 Superfund Site placed on the NPL.	July 1986
Initiated basinwide remedial investigation/feasibility study (RI/FS) under LADWP lead for all the SFV Superfund Sites. SFV Areas 1 and 2 subdivided into OUs to provide a discrete interim remedy for each.	1987
ROD signed for NHOU, selecting an interim groundwater remedy of extraction and treatment to inhibit migration of the groundwater plume and remove TCE and PCE from extracted groundwater to concentrations below the MCL.	September 1987
Construction of the NHOU treatment facility completed.	March 1989
ROD signed for BOU, selecting an interim groundwater remedy of extraction and treatment to partially control the groundwater plume and remove TCE and PCE from extracted groundwater to concentrations below the MCL.	June 1989
NHOU treatment system began operations.	December 1989
ESD #1 signed for BOU to clarify the following: blending could be used to reduce nitrate concentrations in treatment system effluent; reinjection of excess treated water would be required; the remedy could be implemented in phases; and the BOU ROD did not set clean up goals for the aquifer.	November 1990
RI for all SFV Superfund Sites completed (including Area 1). A basinwide groundwater monitoring program for the SFV established (sampling of 84 wells).	December 1992
First NHOU five-year review (USEPA, 1993) completed.	July 1993
Phase I BOU treatment plant constructed.	Summer 1993 – Spring 1994
Final Remedial Design Report for BOU submitted and approved by USEPA.	November 1993
BOU Phase I operational (6,000 gallons per minute [gpm] capacity).	January 1996
ESD #2 signed for the BOU. Eliminates the need for Phase III (additional 3,000 gpm) and reinjection of treated water. The new extraction rate would be calculated as average flow.	February 1997
Phase II BOU treatment plant constructed.	October 1997 – December 1997
Second NHOU five-year review (USEPA, 1998) completed.	July 1998

TABLE 2-1
CHRONOLOGY OF SFV (AREA 1) SITE EVENTS
San Fernando Valley (Area 1) Superfund Site, Los Angeles County, California

Event	Date
Second phase of Operation of BOU initiated (9,000 gpm).	December 1998
City of Burbank assumes responsibility of O&M of BOU.	December 2000
The RWQCB issued CAO No. R4-2003-0037 to Honeywell International Inc. (in the NHO) for chromium, requiring that Honeywell "assess, cleanup, and abate the effects of contaminant discharged to soil and groundwater."	February 2003
Third NHO five-year review (USEPA, 2003) completed.	September 2003
RWQCB revises the February 2003 CAO issued to Honeywell to include VOCs as part of the CAO investigation and cleanup.	September 2004
First BOU five-year review (USEPA, 2004) completed.	September 2004
USEPA completes NHO Chromium Evaluation.	January 2006
Performance attainment study of the BOU groundwater extraction wells, delivery systems, and control processes.	May 2006
Chromium concentration at NHO well NHE-2 reaches 200 µg/L.	December 2006
Well NHE-2 is shut down due to high chromium concentrations.	February 2007
USEPA completes a draft Focused Feasibility Study (FFS) at NHO to improve plume containment, evaluate certain emerging chemicals, and address data needs in the existing NHO monitoring network.	February 2008
Well NHE-2 resumes operating with effluent discharged to the LA sewer system.	September 2008

3.0 Site Background

The SFV Area 1 Superfund Site is defined by an area of VOC-contaminated groundwater that encompasses approximately 6 square miles beneath the Cities of Los Angeles and Burbank in the eastern SFV within the Upper Los Angeles River Area (ULARA).

3.1 Physical Characteristics

The SFV Area 1 Site lies within the SFV, which is a 122,800-acre alluvial basin in the south-central portion of the Transverse Ranges. The SFV is bordered on the east by the Verdugo Mountains, on the west by the Simi Hills, on the north by the Santa Susana and San Gabriel Mountains, and on the south by the Santa Monica Mountains. Average annual precipitation in the SFV (valley floor) is 16.48 inches; however, during Water Year 2006-2007 (October 1 to September 30) the total was 4.39 inches, well below average.

The SFV Area 1 Site has two OUs—NHO and BOU—located within its boundaries, each having a groundwater extraction and treatment system for VOCs. The treatment facility for the NHO is located at 11845 Vose Street, North Hollywood. The eight extraction wells associated with the treatment system are located in an existing electrical transmission line right of way and on LADWP property along Kittridge Avenue in North Hollywood as shown in Figure 3-1. The NHO treatment facility is approximately 3.8 miles north of the Los Angeles River.

The treatment facility for the BOU is located at 3200 Monterey Avenue in Burbank. There are eight extraction wells associated with the BOU treatment facility, as shown in Figure 3-1. Three of these (VO-5, VO-6, and VO-7) are located along Vanowen Street. Four extraction wells (VO-1, VO-2, VO-3, and VO-4) are located along the former southern fence line of Lockheed Martin's Plant B-1 area. This area was redeveloped for commercial use around 2002. Extraction well VO-8 is located adjacent to the treatment facility in the parking lot of the Fire Department Training Center. The BOU treatment facility is located approximately 3.5 miles north of the Los Angeles River.

3.2 Land and Resource Use

Land use in the vicinity of the NHO and the BOU is a mix of residential, commercial, and industrial¹.

The SFV (also referred to in this report as "the basin") is an important source of drinking water for the Los Angeles metropolitan area. The SFV is located in the ULARA, which is under a judgment that adjudicated water rights in the basin, and is administered by the ULARA Watermaster pursuant to the authority of the Superior Court. On average, groundwater in the vicinity of the NHO accounts for approximately 11 percent of the City

¹ The outer boundary of a school is located less than 1,000 feet from the BOU treatment facility.

of Los Angeles' drinking water supply, with the North Hollywood treatment system contributing between 1-2 percent of this amount.

The BOU treatment facility and extraction wells are located down- and cross-gradient from the LADWP production well fields. Groundwater from the BOU treatment facility contributes approximately 50 percent of the City of Burbank's public water supply with the remaining 50% purchased from the Metropolitan Water District (MWD).

The locations of the SFV Area 1 Site wells, facility wells and remedial investigation wells are shown in Figure 3-3 and Figure 3-4.

3.3 History of Contamination

In 1979, as a result of the passage of Assembly Bill 1803, the California Department of Public Health (CDPH) (formerly Department of Health Services or DHS) requested that all major water providers sample and analyze groundwater for contamination as part of a statewide groundwater quality surveillance effort. TCE was consistently detected in a large number of production wells in the SFV at concentrations greater than the MCL. Solvents, including TCE and PCE, were widely used from 1940 to 1967 for dry cleaning and degreasing machinery, and disposal of these solvents was not well-regulated. Numerous parties owned and operated facilities in the SFV Area 1 Site that were known to have used and been the source of releases of solvents. Chromium was used in the metal plating and aerospace industry (metal fabrication), as well as for corrosion inhibition in industrial cooling towers, from the 1940s through the 1980s.

3.4 Initial Response

3.4.1 NHOU Initial Response

In August 1985, samples from 27 of LADWP's 38 most active production wells in the NHOU area contained TCE concentrations greater than the MCL. LADWP shut down several contaminated wells in the North Hollywood (east) well field. LADWP obtained additional water from MWD to augment the water supply.

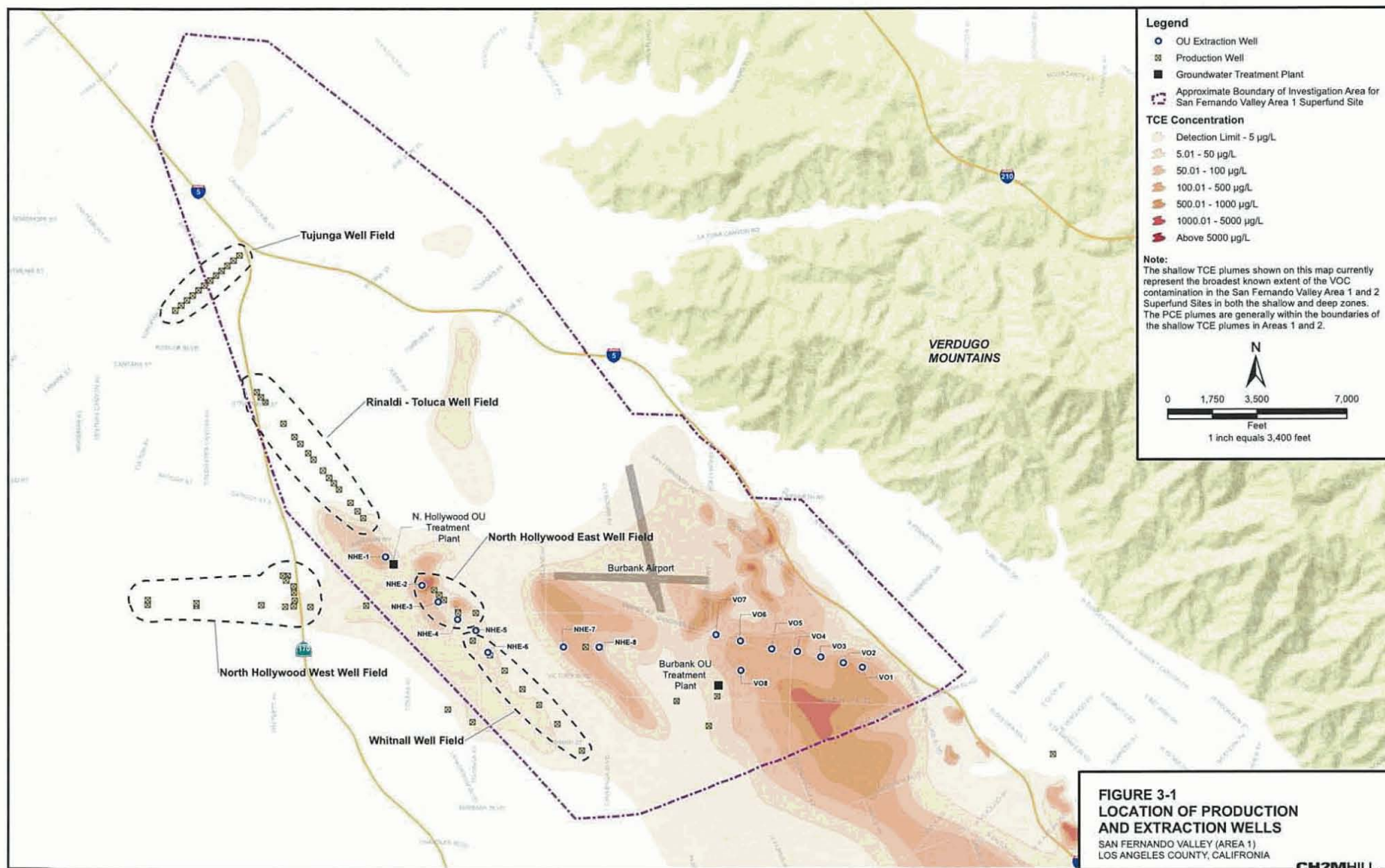
In 1986, LADWP obtained a permit from the South Coast Air Quality Management District (SCAQMD) to "construct and operate" a VOC treatment system in the NHOU, and it obtained an operating permit from CDPH to use the treated water as potable supply.

3.4.2 BOU Initial Response

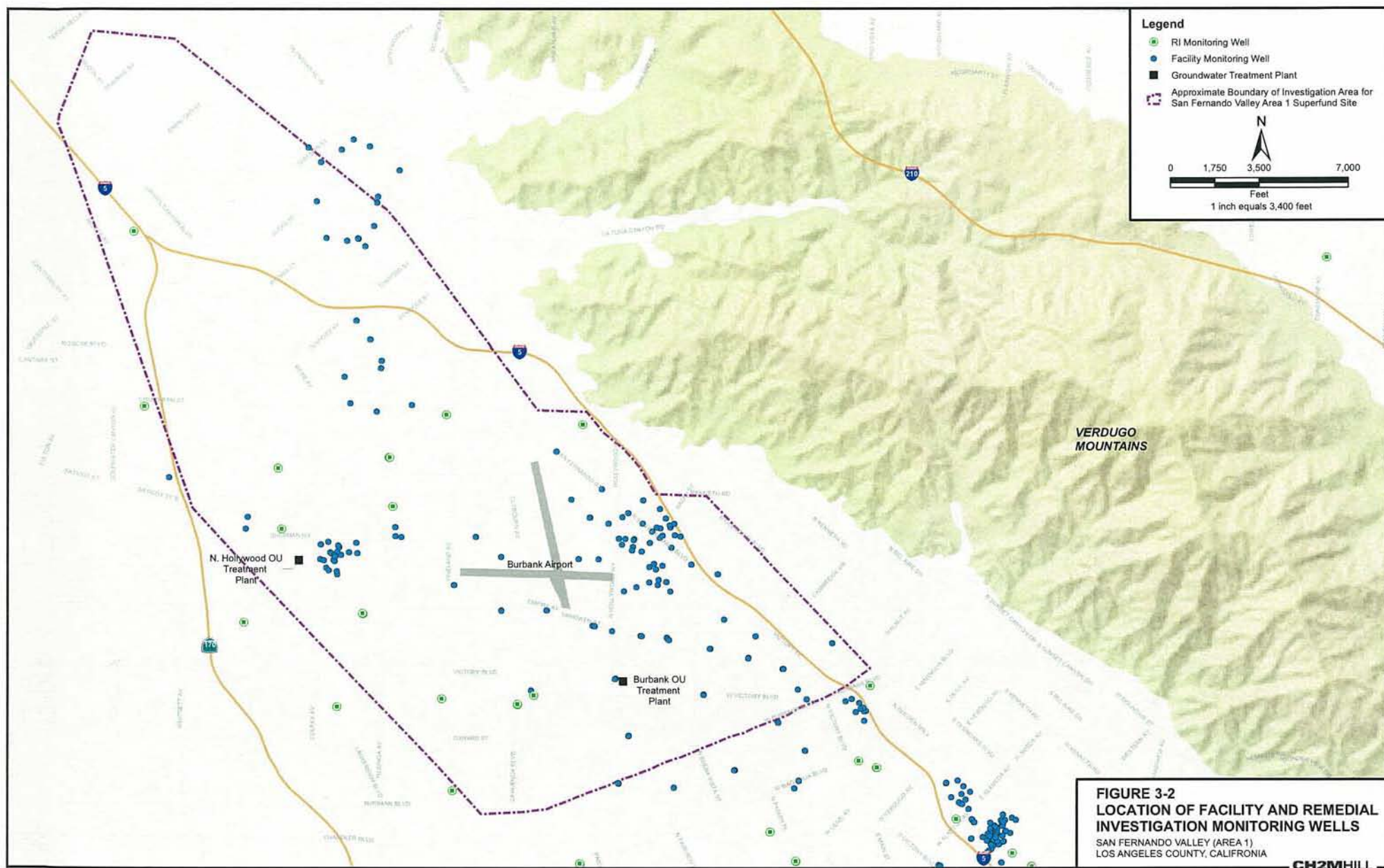
The City of Burbank shut down its municipal production wells when the wells were found to contain TCE and PCE concentrations greater than respective MCLs. Water for the City of Burbank's municipal supply was purchased from MWD. In October 1988, the BOU feasibility study was completed, which reported a maximum concentration of 1,800 µg/L of TCE and 590 µg/L of PCE in municipal well number 10 (inactive). Between 1989 and 1993, a remedy was selected, a basinwide RI and Phase I of the BOU remedy design was completed, and construction of the BOU treatment system was initiated.

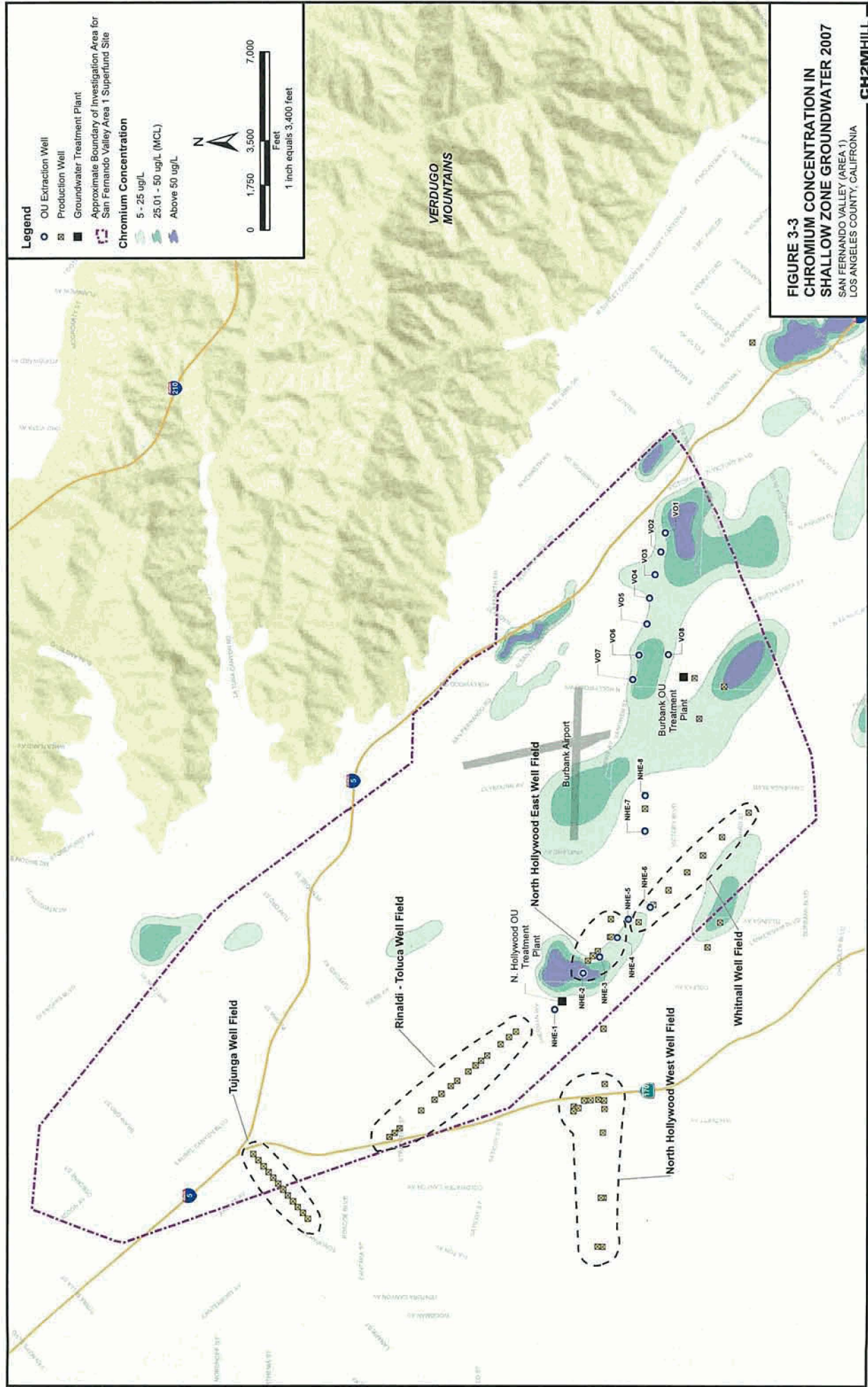
3.5 Basis for Taking Action

TCE and PCE were discovered in groundwater in the NHOU and the BOU areas at concentrations greater than their respective MCLs. The groundwater contamination occurred in a known drinking-water supply aquifer. TCE and PCE are constituents of concern (COCs) due to the potential risk from ingestion, dermal contact, and inhalation of volatilization fractions during showering or bathing. TCE and PCE are classified as probable human carcinogens based on laboratory studies performed on animals.



\\SABLE\CH2M\PROJECTS\W-CONTRACTS\B-1\B-1\FIGURES\FIGURE 3-1\FIGURE 3-1.MXD, REVISED FOR FINAL MAPS AREAT PRODUCTION WELLS, AREA 1, MAY 1, 2008, FIGURE 3-1, PRODUCTION WELLS, AREA 1, FOR 3/23/2008 08:32:52





4.0 Remedial Actions

4.1 Remedy Selection

4.1.1 North Hollywood Operable Unit

The ROD for the NHOU was signed in September 1987. The selected interim remedy addressed VOC-contaminated groundwater in the North Hollywood area. The objective of the selected remedy was to “slow down or arrest” the migration of the contamination plume at the North Hollywood-Burbank well field (i.e., in the area south of the Burbank airport). The 1987 ROD selected groundwater extraction and treatment by air stripping (referred to as “aeration” in historical documents).

Specifically, groundwater is pumped from extraction wells to the treatment plant where it enters the air stripper, which consists of a vertical column containing a packing medium (to increase surface area) over which a countercurrent flow of air is introduced to remove VOCs from the groundwater. The VOCs in the air emissions are filtered through vapor-phase granular activated carbon (VPGAC) prior to discharge to the atmosphere.

Construction of the NHOU treatment system was completed in March 1989, and operation commenced in December 1989. The treated water is conveyed to the City of Los Angeles for municipal supply.

4.1.2 Burbank Operable Unit

The ROD for the BOU was signed in June 1989. An ESD was signed in November 1990 and a second ESD was signed in February 1997. The selected interim remedy addressed the VOC-contaminated groundwater plume in the Burbank area. The remedial action selected for the BOU was designed to achieve two objectives:

- To partially control the movement and spread of ground water contaminants in the Burbank OU area, while contributing to aquifer restoration at the SFV Area 1 Site.
- To address the public health threat posed by contamination of the City of Burbank’s public water supply wells by providing residents in the area with a water supply that meets state and federal drinking water standards.

Specifically, groundwater is pumped from extraction wells to the treatment plant where the VOCs are removed by air stripping and granulated activated carbon (GAC), followed by liquid phase GAC. The treated water is conveyed to the City of Burbank for municipal supply.

4.2 Remedy Implementation

4.2.1 North Hollywood Operable Unit

Construction of the treatment system was completed March 1989, and operation commenced December 1989.

Contaminated groundwater is pumped from seven active extraction wells, as shown in Figure 3-1, and conveyed to the NHOU treatment facility. An eighth extraction well [NHE-1] was constructed, but has never operated because of insufficient groundwater yield.

Contaminated water is treated by the air stripper and the air stream is passed through a GAC system to remove VOCs prior to release to the atmosphere. Treated groundwater is disinfected with chlorine and piped to the North Hollywood Pumping Station Complex (North Hollywood Sump). The groundwater is then blended with water from the Los Angeles Aqueduct Filtration Plant, water purchased from MWD, and groundwater from other LADWP-operated pumping fields located in the vicinity of the NHOU prior to being served to consumers.

4.2.2 Burbank Operable Unit

Phase I of BOU treatment system construction occurred from 1993 to 1994, which included the installation of seven extraction wells capable of producing a combined flow of 6,000 gpm. Phase I began operation in 1996. Phase II consisted of increasing the groundwater extraction rate from 6,000 gpm to 9,000 gpm. The City's municipal supply well W-10 (also known as WP-180) was modified and incorporated in the interim remedy as BOU extraction well VO-8. In December 1997, construction of Phase II of the BOU was completed and operation commenced in 1998.

A pipeline conveys the extracted groundwater to the BOU treatment system. Contaminated groundwater is treated by the BOU air stripper, and the air-stream is passed through a GAC system to remove VOCs prior to release to the atmosphere. Treated groundwater (effluent from the air stripper) is then conveyed to one of two LPGAC polishing trains. The treated groundwater is then conveyed to the City of Burbank Valley Forebay for disinfection and storage, then to the blending facility. At the blending facility, the groundwater is blended with water from MWD to decrease the nitrate concentration prior to distribution to consumers.

4.3 Operation and Maintenance

4.3.1 System Operation and Maintenance

North Hollywood Operable Unit

LADWP is conducting long-term operation, monitoring and maintenance of the NHOU extraction and treatment system in accordance with the EPA-approved Operations and Maintenance (O&M) plan dated 1988, and the revised preventative maintenance schedule implemented in 2003.

The NHOU extraction and treatment system was designed to treat 2,000 gpm of groundwater, but has averaged approximately 830 gpm since 2003. O&M-related issues were common during the previous five-year review period, causing a decrease in operational time and in the volume of groundwater treated by the treatment plant. During the 2003 to 2008 period, O&M delays have been less frequent as a result of the revised preventative maintenance plan, centralized coordination at LADWP, and more clearly defined roles/responsibilities at LADWP. The preventative maintenance schedule is being implemented, and EPA is working with LADWP to resolve O&M issues and implement recommendations.

During the current review period, the NHOU facility was shut down for varied durations due to following operational and maintenance issues:

- Operational shutdown of aeration tower and water supply wells due to air heater malfunction (existing system was replaced with new Chromalox MaxPac II power controller unit) for approximately 2 and half months from September 15, 2004 to November 29, 2004 .
- NHOU was shut down for 20 days (April 26, 2005 to May 16, 2005) due to a water leak in the chlorinator injector water service line.
- NHOU aeration tower and all extraction wells were shut down due to unplanned outage of temperature probes in emissions control unit from October 13, 2006 to first week of November. Other issues identified were a burned motor in extraction well NHE-4 and a faulty circuit breaker in extraction well NHE-7.
- NHOU aeration tower and all extraction wells were shut down for approximately 2 months beginning on October 20, 2007 due to water quality issues (i.e., elevated bromate levels).

During the current review period, the NHOU extraction wells were offline for varied durations due to operational issues and routine maintenance. A majority of the issues were related to pump and/or motor failure due to low water levels in the wells. These individual well shutdowns caused a reduction in overall flow rate to the facility. High concentrations of chromium necessitated the shutdown of extraction well NHE-2 from February 2007 to September 2008, and water from this well is currently being discharged to the Los Angeles sewer system instead of the NHOU treatment system. This is a temporary measure implemented by Honeywell under a Cleanup and Abatement Order (CAO) from the RWQCB. Pursuant to the RWQCB's CAO, a chromium treatment system is expected be installed to ensure that the groundwater extracted by well NHE-2 meets drinking water standards and can be discharged to the influent pipeline of the existing NHOU remedy, for further treatment, blending, and use in LADWP's water supply system.

Operations and maintenance costs in Table 4-1 summarize the actual maintenance costs for years 2004 through 2007.

TABLE 4-1
North Hollywood Operable Unit
Operation and Maintenance Costs 2004 – 2007

Year	Total O&M Costs
2004	\$257,888
2005	\$399,130
2006	\$451,360
2007	\$480,163
Total for Years 2004 - 2007	\$1,588,541

Burbank Operable Unit

The City of Burbank (via contractor Southwest Water Company) is conducting long-term monitoring and maintenance activities according to the O&M plan provided to EPA in 1998. The O&M plan is currently being revised.

The BOU extraction and treatment system was designed to treat 9,000 gpm of groundwater, but has averaged approximately 5,700 gpm since 2004. EPA is working with the City of Burbank to resolve O&M issues and implement recommendations to improve the extraction rate and overall efficiency of the system.

During the current review period, the entire BOU facility or one of two of the VPGAC trains of the BOU was shut down for varied durations as follows:

- Fire damage to "A Train" due to overheating of the offgas heater. The A Train fire repairs resulted in the entire plant being out of service for approximately 6 weeks.
- Numerous screen failures in the VPGAC adsorbers often caused one of the treatment trains to be offline for a period of a few weeks.
- The VPGAC retrofit project, which was a planned outage, was planned with facility operations at half flow for a period up to 6 months. However, the A Train fire occurred at the beginning of the retrofit project resulting in the BOU operating at half capacity for approximately 5 months.
- The main influent pipeline was punctured during a fiber optic cable installation construction effort in November 2005. The entire system was down for a period of approximately 3 weeks until the pipeline was repaired.

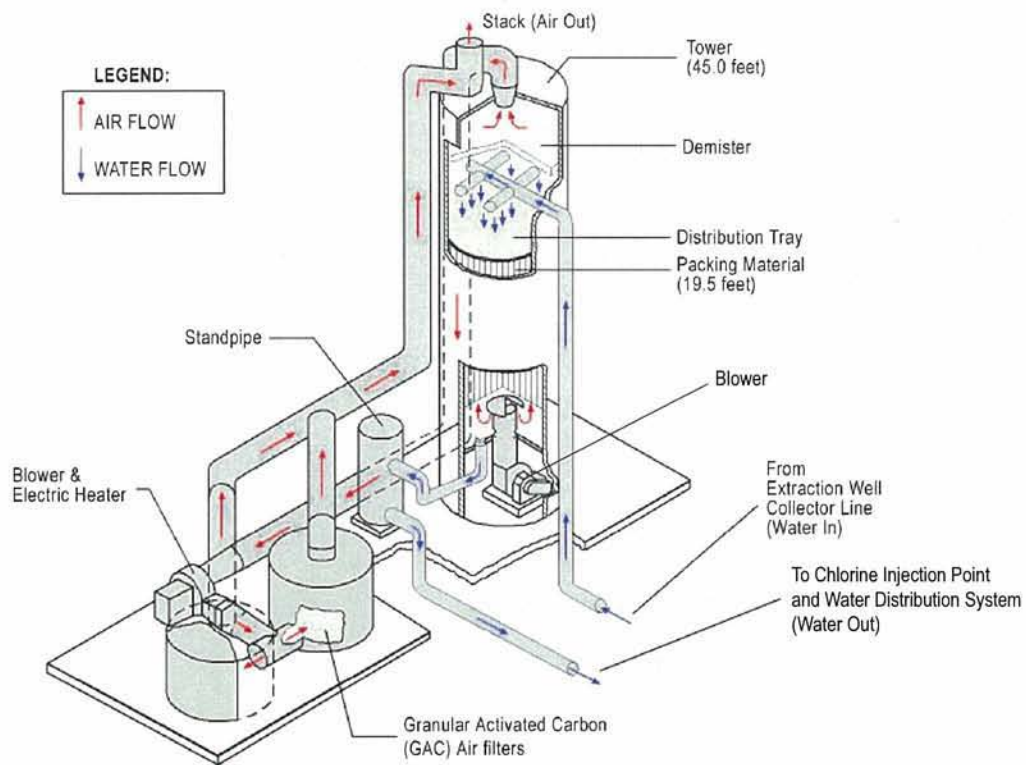
The extraction wells had several short-term outages resulting from operational issues such as burned out motors and conductor insulation failure, for periods ranging from a few days to a few weeks.

Operations and maintenance costs in Table 4-2 summarize the actual maintenance costs for the City of Burbank Fiscal years 2003/2004 through 2007/2008.

TABLE 4-2
North Hollywood Operable Unit
Operation and Maintenance Costs 2004 – 2008

City of Burbank Fiscal Year	Total O&M Costs
2003/2004	\$4,100,926
2004/2005	\$4,880,316
2005/2006	\$4,910,312
2006/2007	\$5,457,761
2007/2008	\$3,579,869
Total for Fiscal Years 2003/2004 – 2007/2008	\$22,929,184

SCHEMATIC DIAGRAM OF NHOU GROUNDWATER TREATMENT FACILITY



SCHEMATIC DIAGRAM OF BOU GROUNDWATER TREATMENT FACILITY

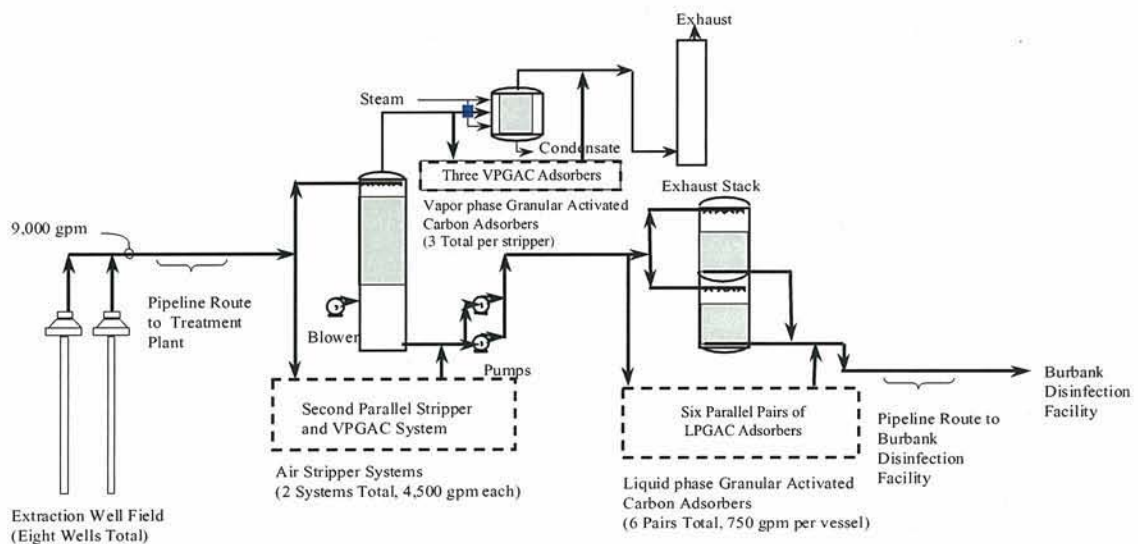
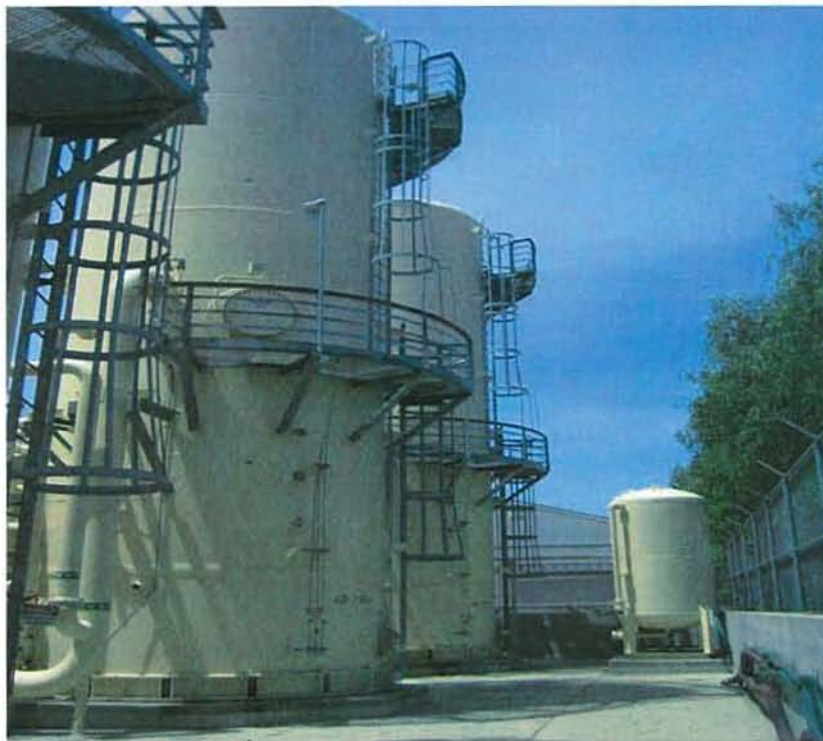


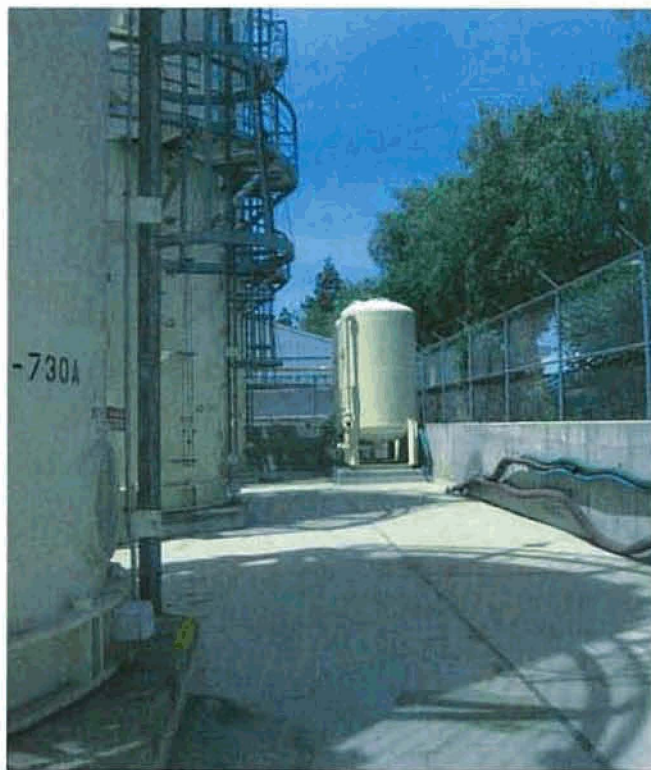
FIGURE 4-1
SCHEMATIC DIAGRAM OF NHOU AND BOU
GROUNDWATER TREATMENT FACILITY
 SAN FERNANDO VALLEY (AREA 1) SUPERFUND SITE
 LOS ANGELES COUNTY, CALIFORNIA



Photograph 1: Burbank Operable Unit (BOU) Aeration tower



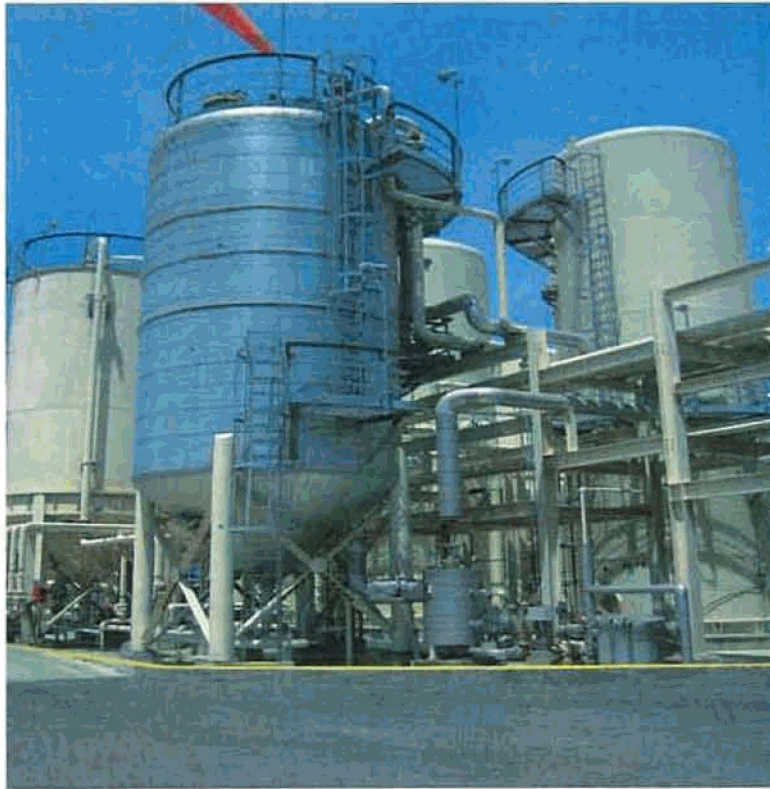
Photograph 2: BOU Aeration Tower-AD 740A and GAC Filter



Photograph 3: BOU Tank - 730A



Photograph 4: BOU Tank - 920



Photograph 5: BOU Vapor-Phase Granular-Active Carbon (VPGAC)



Photograph 6: BOU VPGAC Train (VPGAC AD-3208 shown in photo)



Photograph 7: BOU Pump Station



Photograph 8: BOU Boiler Room



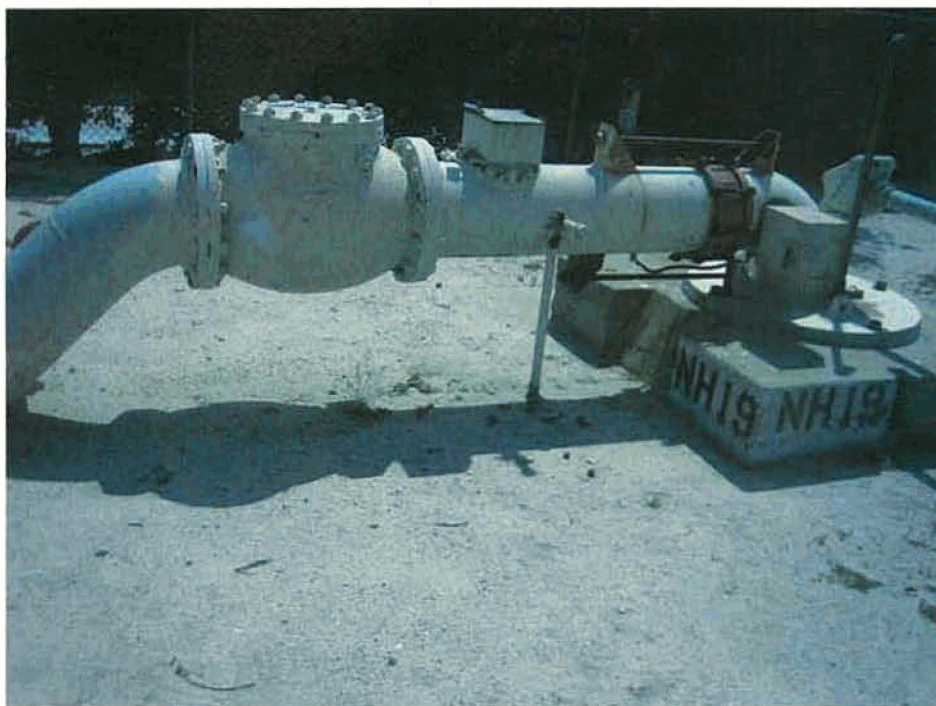
Photograph 9: North Hollywood Operable Unit (NHOU) Granular-Active Carbon Air Filter



Photograph 10: NHOU Sodium Hexametaphosphate Tank



Photograph 11: NHOA Aeration Tower



Photograph 12: NHOA Monitoring Well NH-19



Photograph 13: NHOU Monitoring Well NH-21



Photograph 14: NHOU Extraction Well Control Panel

5.0 Progress Since the Last Review

5.1 Previous Protectiveness Statements

5.1.1 North Hollywood

The protectiveness statement for the NHOU identified in the *Final Third Five-Year Review Report for North Hollywood Operable Unit San Fernando Valley (Area 1) Superfund Site* is as follows (USEPA, 2003):

The interim remedy at the NHOU currently protects human health and the environment because the concentration of TCE and PCE in treated groundwater is less than ROD selected clean-up goals and no other potential COCs currently exceed health-based standards. However, in order for the remedy to be protective of human health and the environment in the long-term, VOC plume containment should be addressed to control potential exposure pathways to ensure continued protectiveness. In addition, there should be ongoing reporting of extraction well concentrations of total chromium, hexavalent chromium, and perchlorate, COCs not previously identified in the ROD. Additional sampling and reporting is recommended. In order to provide continued protectiveness in the long-term, periodic review of emergent chemical concentrations and their associated MCLs or risk-based treatment standards should be made.

A protectiveness determination for Area 1 as a whole cannot be made at this time until the five-year review report is complete for the Burbank OU. It is expected that this will be completed during 2004. This site-wide review will address the long-term protectiveness issues noted above.

5.1.2 Burbank Operable Unit

The protectiveness statement for the BOU identified in the *Final First Five-Year Review Report for Burbank Operable Unit San Fernando Valley (Area 1) Superfund Site* is as follows (USEPA, 2004):

The assessment of this five-year review found that the interim remedy for the BOU was constructed in accordance with the ROD and ESDs and is currently protective of human health and the environment; the concentrations of TCE and PCE in BOU treatment system effluent are less than regulatory cleanup goals. Additionally, the concentration of nitrate in treated groundwater after the blending point is less than regulatory cleanup goals and no other potential constituents of concern currently exceed health-based standards in water from the blendpoint. While current air emissions may be within USEPA's risk range of 10^{-4} to 10^{-6} , an air emissions evaluation will need to be conducted in order to determine air protectiveness at the BOU. The findings of this review and the NHOU five-year review, which was completed in September 2003, both concluded that VOC plume containment should be evaluated and addressed to ensure continued protectiveness. In addition, the City of Burbank should continue ongoing sampling and reporting of extraction well

concentrations of emerging contaminants, such as 1,2,3-TCP (weekly), total chromium (monthly), hexavalent chromium, 1,4-dioxane (weekly), and perchlorate (annually)—COCs not previously identified for treatment in USEPA decision documents. In order to provide continued protectiveness in the long term, periodic review of emergent chemical concentrations and their associated maximum contaminant levels or risk-based treatment standards should be performed.

5.2 Status of Issues and Recommendations

This section provides a summary of the status of recommendations identified in the previous five-year reviews for the NHOU (2003) and the BOU (2004), and results of the implemented actions for each OU. 5.2.1 North Hollywood Operable Unit

Issues identified during the previous five-year review process relate to groundwater containment concerns, management of the treatment system, and health and safety issues for workers at the groundwater pump and treat system.

Issue	Recommendation	Status
The treatment system has never operated at the 2,000 gpm capacity. Complete containment of the TCE groundwater plume is in question.	Evaluate TCE plume capture and implement actions to increase capture, if necessary.	EPA issued a Draft Focused Feasibility Study in February 2008 and plans to complete it in Fall 2008. The ensuing decision document will address containment issues and is scheduled for 2009.
NHOU treatment system operations and maintenance issues are overly complex.	Expand the responsibilities of the current LADWP project manager to include all aspects of the treatment system	Since 2003, coordination has been centralized at LADWP and roles/responsibilities are defined.
The material presented in quarterly reports from LADWP is not comprehensive in terms of remedy performance.	List of specific air quality data, water monitoring data, and maintenance reporting suggested to improve reports.	Since 2003, LADWP is presenting air monitoring and water quality data in the quarterly reports and the reports are more comprehensive.
GAC change-out occurred after air quality exceeded SCAQMD limits during 1998 and 1999 due to frequency of sampling.	Revise air sampling plan.	In 2003, modifications to sampling plan were made. There have been no air emission exceedences of SCAQMD permit requirements since the last five-year review period.
There is no vent low to the ground in the chlorine storage building, which is a health and safety issue.	Install a vent low to the ground.	Site inspections records indicate that an exhaust vent was installed close to the ground in the storage building in 2003.
The site inspection noted that there is excessive white particulate dust in the blower	Investigate what the white particulate dust is and whether it impacts H&S or the	The 2003 investigation indicates that the dust consisted of perlite, a nuisance

Issue	Recommendation	Status
room. This particulate could be a health and safety issue for site workers. Source of particulate is from the adjacent property.	operation of the facility.	dust. Results of monitoring indicated that levels were well below occupational safety and health standards.
During the Site visit, it was noted that the flow meters for wells 4, 6, and 8 were broken.	Repair the flow meters.	LADWP completed all necessary repairs to the three flow meters during September 2003.

5.2.1 Burbank Operable Unit

Issues identified during the previous BOU five-year review process primarily related to the extraction and treatment system's inability to consistently operate at the design flow rate of 9,000 gpm, and increased periodic evaluation of the VOC capture zone. This section summarizes the status of the issues and recommendations for improvement that were identified in the previous five-year review.

Issue	Recommendation	Status
The treatment system has rarely operated at 9,000-gallons per minute (gpm).	1) Complete the Performance Attainment Study; 2) evaluate and modify, where needed, O&M practices that influence system downtime; 3) periodically evaluate well field mechanics.	In May 2006, the Performance Attainment Study was completed. Issues identified in the report are: 1) changed aquifer conditions; 2) reliability or maintenance downtime; 3) limitations on flow caused by cooling shroud; and 4) pipeline obstruction. Further assessment is continuing as part of ongoing optimization activities.
Emergence of new COCs such as chromium and 1,2,3-TCP.	1) Evaluate and address 1,2,3-TCP breakthrough; 2) revise chromium and 1,2,3-TCP blending and pumping plans.	1) In 2005, modifications to backwash procedures were made to address breakthrough which decreased the number of breakthroughs. More O&M modifications are being made; 2) pumping has been modified and the pumping plans are being revised.
Increasing concentrations of VOCs in the B-zone.	1) Evaluate vertical migration; 2) ensure all well packers are operating as intended.	1) Annual groundwater vertical migration is evaluated and the data find no emerging trends; 2) an evaluation of the well packers was completed in Feb 2005 and it found them to be functional.

Issue	Recommendation	Status
Hydraulic influence of pumping of nearby production well fields affects the ability of the BOU well field to capture plume.	1) The Watermaster should provide annual updates to EPA; 2) an institutional control should be put in place to ensure that planned groundwater activities in the vicinity do not decrease the performance of the well field.	1) The Watermaster has provided annual updates of the activities within the SFV, including the BOU hydraulic area of influence; 2) the City of Burbank has no plans to install or operate groundwater extraction wells other than the existing BOU remedy extraction wells.
Recent air emissions data measured at VPGAC units exceed the SCAQMD substantive requirements.	1) Reassess risk; 2) increase air monitoring frequency.	1) New risk assessment indicates that the air emissions meet the SCAQMD substantive requirements; 2) air monitoring was increased to every 8 days.
NPDES sampling is not comprehensive as it does not include handling and disposal of backwash water.	1) Analyze backwash samples; 2) modify and document backwash water handling procedures.	1) There has been one backwash since the last FYR. Samples were collected and analyzed; 2) backwash water handling procedures have been modified.

6.0 Five-year Review Findings

The following sections discuss findings from this five-year review.

6.1 Five-year Review Process

The five-year review consisted of: a review of relevant documents (Appendix B); a regulatory review; a site inspection, and interviews with staff involved in O&M at the treatment systems, staff at CDPH, and the Assistant to the ULARA Watermaster.

6.2 Community Notification and Involvement

A public notice indicating the ongoing five-year review and its anticipated completion date was published in *Los Angeles Daily News* newspaper on September 10, 2008. The five-year review report will be placed in the site information repositories.

6.3 Document Review

As a part of the five-year review process, a brief review of documents related to site activities was conducted. The documents chosen for review primarily focused on site activities since 2004, but ranged in publication date from 1987 to the present. Appendix B provides a list of the documents reviewed as part of this report.

6.4 Data Review

To evaluate whether the interim remedies at the NHOU and BOU are meeting the RAOs and remain protective of human health and the environment, data regarding groundwater quality trends throughout Area 1, focusing on the principal contaminants of concern, plume containment achieved by NHOU and BOU extraction wells, and NHOU and BOU groundwater treatment system performance, were reviewed. A detailed discussion of the data review analysis can be found in Appendix B, Data Review.

6.4.1 Area 1 Groundwater Quality

The contaminants of primary concern in Area 1 are TCE, PCE, and chromium. Nitrate is also present in groundwater in excess of the MCL as a result of past agricultural and sewage disposal practices in the SFV, but is not targeted for treatment as part of the NHOU or BOU interim remedies. When elevated nitrate concentrations are present in groundwater produced by extraction wells or municipal water supply wells in Area 1, they are mitigated by blending with imported water from other sources. Blending, disinfection, and other routine municipal water treatment and delivery operations in Area 1 are performed by the Cities of Los Angeles or Burbank.

The TCE and PCE plumes in Area 1 have fluctuated in extent and concentration during the review period, but most have not exhibited significant increasing or decreasing trends that are likely to impact operation of the NHOU or BOU groundwater extraction and treatment systems. The fluctuations may have resulted from changing groundwater levels, migration of plumes, or changes in geochemical conditions in the aquifer or they may reflect the incorporation of additional (or more recent) water quality data. Other VOCs present in the TCE and PCE plumes appear to be following a similar trend. The exception to the pattern of TCE and PCE concentrations appears at certain LADWP water supply wells located north to northwest of the NHOU remedy. The TCE and PCE concentrations have increased in certain LADWP water supply wells at LADWP's Rinaldi-Toluca and North Hollywood West well fields) during 2007 and 2008, suggesting an increasing trend in this area.

Chromium occurs naturally in groundwater throughout Area 1 at low concentrations, typically less than 5 µg/L. Due to geochemical conditions in Area 1, chromium concentrations in groundwater decrease rapidly with depth and are infrequently detected above the MCL at depths greater than 100 feet below the water table. With one significant exception, the chromium plumes (which are dominated by hexavalent chromium) have fluctuated in extent and concentration during the review period, but have not exhibited consistent increasing or decreasing trends. Some of the apparent changes over time are a result of improved plume delineation, as more wells in the NHOU were sampled for chromium during the FFS.

The data suggest an exception to the general chromium trend in the NHOU occurs at the Honeywell facility. The shallow zone chromium plume emanating from the Honeywell facility in the NHOU substantially increased in size and concentration in late 2006 and early 2007, coincident with a rise in groundwater levels in the NHOU during this period. This plume is smaller than, and surrounded by, the VOC plume emanating from the Honeywell facility, and is currently hydraulically contained by the NHOU extraction wells. Chromium concentrations have stabilized or declined slightly at most wells near the Honeywell facility since early 2007. However, the NHOU treatment system does not include a process for chromium treatment. High chromium concentrations at well NHE-2 resulted in that well being shut down from February 2007 until September 2008, when Honeywell installed temporary VOC wellhead treatment and obtained a permit to discharge the treated groundwater to the Los Angeles sewer system. In response to the high chromium concentrations at well NHE-2, options for adding a chromium treatment process to the NHOU treatment system are included in the NHOU FFS (EPA, 2008).

Of the emerging contaminants, 1,2,3-TCP and 1,4-dioxane are the most frequently detected at concentrations exceeding the CDPH notification levels in Area 1. Although historical data are limited, based on available data, concentrations of these emerging contaminants do not exhibit a general increasing trend throughout Area 1. The concentration in the combined influent from all of the NHOU extraction wells is calculated to be below the notification level. As noted previously, groundwater extracted by well NHE-2, where 1,4-dioxane concentrations have recently exceeded the notification level, is currently discharged to the Los Angeles sewer system. Wellhead treatment for 1,4-dioxane is expected to be implemented at well NHE-2, if necessary, before the well is reconnected to the NHOU treatment system. The VOC treatment systems being considered in the NHOU FFS would treat influent groundwater for 1,2,3-TCP and 1,4-dioxane, eliminating the potential need for

wellhead treatment of these contaminants. In the BOU, 1,2,3-TCP is effectively treated by the existing LPGAC treatment process for VOCs, and is not anticipated to present further operational issues for the treatment plant.

6.4.2 Groundwater Extraction and Treatment Systems

NHOU

The NHOU extraction and treatment system has operated at a long-term average pumping rate of approximately 830 gpm, with average influent TCE and PCE concentrations of 61 µg/L and 9 µg/L, respectively, during the review period. Carbon tetrachloride, another VOC, was also frequently detected in the treatment system influent during the review period at an average concentration of 0.8 µg/L (the MCL for carbon tetrachloride is 0.5 µg/L). Following treatment, the discharged groundwater has consistently been well below the MCLs for these contaminants, ranging from non-detect to 1.7 µg/L for TCE, and typically non-detect for PCE and carbon tetrachloride. The system is currently operating within its design parameters for removal of VOC contamination.

Chromium is not removed by the VOC treatment process currently in place at the NHOU; total and hexavalent chromium concentrations have been detected in the treatment plant effluent ranging from non-detect to a maximum of 35 µg/L. Extraction well NHE-2 was producing the highest concentrations of chromium in the influent to the treatment plant. As noted previously in this report, extraction well NHE-2 was shut down from February 2007 to September 2008 due to chromium concentrations in excess of 200 µg/L, and water from this well is currently being discharged to the Los Angeles sewer system instead of the NHOU treatment system.

Of the emerging contaminants of concern, 1,2,3-TCP has occasionally been detected at NHOU extraction wells NHE-2 and NHE-5 at concentrations above the notification level, but it has not been detected in the treatment plant influent or effluent. 1,4-Dioxane has consistently been detected at concentrations above the notification level (3 µg/L) at extraction well NHE-2. However, 1,2,3-TCP and 1,4-dioxane concentrations at the extraction wells have not shown a discernible increasing trend during the review period, and the concentrations in the combined influent from all of the NHOU extraction wells are calculated to be below the notification levels. Wellhead treatment for 1,4-dioxane will be implemented at well NHE-2, if necessary, before the well is reconnected to the NHOU treatment system. Furthermore, the VOC treatment systems being considered in the NHOU FFS would remove 1,2,3-TCP and 1,4-dioxane.

Approximately 1,755 million gallons of groundwater have been treated at NHOU since the previous five-year review, resulting in the removal from the aquifer of approximately 1,244 pounds of VOCs.

BOU

The average combined pumping rate for the BOU extraction wells during the review period has been approximately 5,700 gpm, with average BOU extraction well TCE and PCE concentrations of 114 µg/L and 203 µg/L, respectively. The treated groundwater has consistently been well below the MCLs for these contaminants. The treatment system is operating within its design parameters for VOC removal.

Total and hexavalent chromium concentrations at the BOU extraction wells do not currently indicate significant increasing or decreasing trends that would be expected to further impact treatment system operations in the future. However, similar to the NHOU, the BOU treatment system does not include a process for chromium removal. If the CDPH promulgates an MCL for hexavalent chromium that is much lower than the current MCL for total chromium, mitigation measures may be required. Chromium concentrations and trends at the BOU extraction wells will continue to be monitored.

Of the emerging contaminants, 1,2,3-TCP has frequently been detected at the BOU extraction wells at concentrations above the notification level. However, 1,2,3-TCP is effectively removed by the LPGAC polishing treatment process for VOCs at the BOU treatment plant. Therefore, 1,2,3-TCP is not anticipated to present significant operational issues for the treatment plant or affect the protectiveness of the interim remedy in the future. Periodic sampling does not indicate that elevated 1,4-dioxane concentrations are present in the combined influent to the BOU treatment plant. However, 1,4-dioxane is not removed by the BOU treatment processes and is commonly detected in groundwater in Area 1 at concentrations that exceed the notification level. Monitoring will continue for these constituents.

The BOU extraction and treatment system was either partially or completely shut down for 5 months in early 2008 (February through July) for planned maintenance and unplanned repairs. The BOU treatment system has subsequently been repaired and maintenance issues addressed to prevent a similar shutdown in the future.

Approximately 11,931 million gallons of groundwater have been treated at the BOU since the previous five-year review, resulting in the removal from the aquifer of approximately 32,480 pounds of VOCs.

6.4.3 Containment of Contaminated Groundwater

The primary objective for the NHOU groundwater extraction and treatment system is to inhibit the migration of contamination in the North Hollywood area. Similarly, the primary objective for the BOU groundwater extraction and treatment system is to partially control the movement and spread of ground water contaminants in the BOU area, while contributing to aquifer restoration at the SFV Area 1 Site.

The contaminants of concern at the time the interim remedies were designed were primarily VOCs, particularly TCE and PCE. Neither the NHOU nor BOU system was designed to treat chromium-contaminated groundwater. The locations for NHOU and BOU extraction well fields were selected to intercept and treat the known high-concentration cores of TCE and PCE plumes detected in Area 1. Although the extraction wells withdraw water from both the Shallow and the Deeper Zones, most groundwater is extracted from the Shallow Zone, where contaminant concentrations are highest. Groundwater flow modeling of the NHOU and BOU conducted in 2007 and 2008, respectively, evaluated the potential impacts temporary shutdowns of extraction wells have had on groundwater plume containment.

NHOU

Groundwater flow modeling for the NHOU FFS indicates that when LADWP's production well fields near North Hollywood are operating at average pumping rates, the seven active

NHOU extraction wells (NHE-2 through NHE-8) hydraulically contain most of the high-concentration core (greater than 50 µg/L) of the Shallow Zone VOC plumes emanating from the Honeywell facility and from the westernmost part of the Burbank Airport. These two plumes, where VOC concentrations in excess of 1,000 µg/L were detected as recently as 2007, were the targets for hydraulic containment when the NHOU extraction and treatment system was designed in the 1980s (only one of the NHOU extraction wells, NHE-6 is screened through a significant portion of the deeper aquifer zone underlying the NHOU). Therefore, the system is considered to be meeting the objective of inhibiting migration of contamination in the North Hollywood area, although it has not completely contained all contaminant migration, particularly in the Deeper Zone.

Several factors have prevented the NHOU extraction and treatment system from completely inhibiting contaminant migration, as follows:

1. As noted previously, the NHOU extraction well field was designed primarily to contain the high concentration core of two Shallow Zone VOC plumes. By the time the extraction wells began operation in late 1989, some VOC contamination in NHOU groundwater had already migrated laterally or vertically beyond the zone of hydraulic control that the extraction wells were designed to achieve.
2. During and soon after construction of the NHOU extraction wells and treatment system, LADWP completed construction of the Rinaldi-Toluca water-supply well field in North Hollywood and the Tujunga well field immediately to the north, in Pacoima. The production wells in these well fields withdraw groundwater primarily from deeper aquifer zones (below the Shallow Zone). Operation of these two new water-supply well fields contributes to regional groundwater level drawdown that extends to the NHOU extraction wells.
3. The system has experienced operation and maintenance issues that have limited its performance, further diminishing the long-term average pumping rate and the extent of hydraulic containment achieved by the NHOU extraction wells.
4. Detection of high concentrations of chromium at extraction well NHE-2 caused this well to be shut down through much of 2007 and 2008. Well NHE-2 is the closest extraction well to the high concentration VOC and chromium plume emanating from the Honeywell facility and, therefore, its operation is important for limiting contaminant migration in the NHOU.

The NHOU extraction and treatment system was designed to treat 2,000 gallons per minute (gpm) of groundwater but, for the reasons noted above, has averaged approximately 830 gpm during the review period (the long-term average pumping rate from 1989 to the present is approximately 820 gpm). Although the NHOU extraction wells typically achieve containment of most of the high-concentration VOC and chromium contamination in the Shallow Zone of the NHOU, and inhibit the migration of contamination, they do not achieve complete hydraulic containment of contaminated groundwater, particularly in the Deeper Zone. Therefore, some migration of groundwater has occurred in the NHOU from areas with high levels of TCE, PCE, and chromium contamination (50 µg/L or greater) to areas of lower levels or no contamination.

Prior to implementation of the NHOU interim remedy, migration of contaminated groundwater in the North Hollywood area resulted in contamination of numerous LADWP production wells. LADWP has voluntarily reduced its use of and has shut down water supply wells in areas where high concentrations of contaminants have migrated away from the NHOU system as an interim measure to ensure protection of human health. However, the aquifer underlying the NHOU is an important source of water supply for LADWP, and shutdowns or use limitations at water supply wells can not continue indefinitely without seriously impacting water supply options for the LADWP and other groundwater users in the SFV. Furthermore, FFS modeling results indicate that if LADWP's North-Hollywood-area production well fields are pumped at maximum rates for an extended period, the NHOU extraction wells will not be able to contain the high-concentration contaminant plumes. In response to these issues, EPA conducted the NHOU FFS and plans a new remedy decision for remedy improvements in 2009 to enhance plume capture and add chromium treatment.

BOU

The BOU extraction system has achieved partial control of the movement and spread of groundwater contaminants in the BOU area, while contributing to aquifer restoration in Area 1. The average combined pumping rate for the BOU extraction wells is approximately 5,700 gpm. Similar to the NHOU extraction wells, the BOU extraction wells withdraw groundwater primarily from the Shallow Zone. Modeling results indicate that the area of hydraulic containment achieved by the BOU extraction wells in the Shallow Zone extends southward to the boundary between Area 1 and Area 2 of the SFV Superfund Site, and includes much of the Burbank Airport area. The capture zone for the BOU extraction wells also extends vertically into the Deeper Zone, although the model-forecast aerial extent of hydraulic containment in this zone is not as large as in the Shallow Zone. Groundwater contamination escaping capture by the BOU extraction wells migrates southeastward and is captured by the Glendale North and South Operable Unit extraction wells.

The BOU extraction and treatment system was either partially or completely shut down for 6 months in 2008 (February through August) for planned maintenance and unplanned repairs. Groundwater modeling indicated that hydraulic containment of the VOC plume in BOU was diminished by approximately 3% during this period of intermittent operation. The BOU treatment system has subsequently been repaired and system changes have been made to address the VPGAC O&M issues that resulted in shut downs during this five-year review period.

6.5 Site Inspection

Site inspections at the NHOU and the BOU treatment facilities were conducted on April 24, 2008 and April 25, 2008.

Don Stone, Site Manager for the NHOU, guided the inspection team on its tour of the treatment system and the accessible extraction wells. The fence gate to the pump station was locked at the time of inspection. Signs are displayed and an alarm system is maintained in the pump station to prevent unauthorized entry to the station. The onsite treatment system, including the air stripper, VPGAC units, and filters, appeared to be in good

condition. In general, the treatment system and extraction wells appeared to be in good condition, and there were no indications of damage or disturbance to the wells. The Site Manager indicated that, since groundwater levels in the valley have declined, it has been difficult for pumps to extract water from the wells and that the wells should be installed at greater depths. Mr. Stone added that there are also occasional problems with flow meters and the wells are not operating at full capacity.

Albert Lopez, Plant Superintendent for the BOU, guided the inspection of the treatment system and the accessible extraction wells. The fence and gate to the pump station was locked at the time of inspection. An operator is onsite 24 hours per day and cameras have been installed to prevent unauthorized entry to the station. The onsite treatment system, including filters used for discharge water and carbon absorption units, appeared to be in good condition. One of the air strippers was affected by fire and was not in use at the time of the inspection. Sampling ports were properly marked and functional, equipment was properly labeled, and a current maintenance log was on display. The treatment building and the control room are in good condition. Chemicals and spare equipment were properly stored. Monitoring wells were properly secured and functioning. Mr. Lopez indicated that there is inadequacy during wellhead testing (efficiency test) and needs clarification on how to test efficiency on one well. Mr. Lopez also mentioned that VPGAC screen failure was one of the O&M issues because carbon was traveling to other unit processes. The VPGAC retrofit which addresses these issues, was completed in August 2008.

The site inspection checklist is incorporated in Appendix C of this five-year review report. Select site photographs are located in Appendix D.

6.6 Interviews

As part of the five-year review process, technical interviews were conducted with personnel having knowledge of and/or concerns with the NHOH and BOU.

6.6.1 Technical Interviews

NHOH

The treatment system is currently operated by LADWP, which conducts daily site activities including treatment system operations, groundwater monitoring, site inspections, routine maintenance, etc. Robert McKinney is the LADWP groundwater group manager. According to Mr. McKinney, the overall impression of the remedial action work being conducted at the site is that the treatment facility is not sufficient to capture the plume and prevent migration of the contaminants. He indicated that the remedy is not functioning as expected, and the system is undersized for what needs to be accomplished. He recommends expanding the remedial action work to increase treatment capacity and increase the number of extraction wells to contain and capture contamination. In addition, he stated that this treatment should also address the emerging chemical contamination problems. LADWP is not aware of any community concerns at the site.

Mark Mackowski, the ULARA Watermaster, also indicated that the NHOH treatment facility is not functioning as expected due to insufficient plume containment. Mr.

Mackowski suggested a re-evaluation of the treatment system to address plume containment and also indicated that the wells are not placed in optimal locations.

Please refer to the completed interview forms provided in Appendix C for detailed interview discussions.

Jeff O'Keefe with CDPH indicated that his interest in the remedial action work is concerned only with treated water being used for potable use and, hence, his impression of the remedial work conducted at the site is good, except for high concentrations of hexavalent chromium and VOCs in the aquifer and at extraction well NHE2.

Copies of the completed interview forms are provided in Appendix C.

BOU

Gene Matsushita and Linda Gertler of Lockheed Martin represent a responsible party for the remedial activities being conducted at the BOU in the SFV. The treatment system is currently operated by the City of Burbank and its contractor Southwest Water Company. Albert Lopez (Operations Superintendent from City of Burbank) and Eric Mills (plant operator with Southwest Water) are responsible for conducting daily site activities, including treatment system operations, groundwater monitoring, site inspections, routine maintenance, etc.

According to Lockheed Martin's representatives and the plant operator, the overall impression of the remedial action work being conducted at the site is that the treatment system has performed satisfactorily for the project. Lockheed Martin recommends developing a long-term capital improvement plan and a preventive maintenance plan for the facility so that projects can be designed and implemented in a reasonable time frame prior to the onset of any critical operational problems. Lockheed Martin and Southwest Water Company are not aware of any community concerns at the site.

Mark Mackowski indicated that the overall impression of the remedial action work at BOU is moderate to good, with the exception that the plant has never produced to its full design capacity of 9,000 gpm for a sustained period of time. Mr. Mackowski suggested implementation of the packer removal test work plan.

Please refer to the completed interview forms provided in Appendix C for detailed interview discussions.

David Lozano with CDPH indicated that the remedial action work conducted at the site and the remedy is performing as expected. Mr. Lozano receives monthly operation reports and is satisfied with the reports. CDPH is not aware of any ongoing community concerns or issues regarding the site.

Copies of the completed interview forms are provided in Appendix C.

7.0 Technical Assessment

This section evaluates the implementation of the remedy at each OU, whether each remedy is performing as intended, and whether the remedies are protective of human health and the environment.

7.1 Question A: Is the remedy functioning as intended by the decision documents?

7.1.2 North Hollywood Operable Unit

Remedial Action Performance and Operations and Maintenance

All remedial actions pertaining to groundwater, as mandated in the 1987 ROD, have been implemented. The NHOU groundwater treatment facility has treated groundwater to concentrations below MCLs for all COCs. The NHOU groundwater treatment facility has met the substantive requirements of the CDPH and SCAQMD permits.

Although the NHOU extraction wells typically achieve containment of most of the high-concentration VOC and chromium contamination in the Shallow Zone of the NHOU, and by doing so inhibit the migration of contamination, they do not achieve complete hydraulic containment of contaminated groundwater, particularly in the Deeper Zone. Therefore, some migration of groundwater has occurred in the NHOU from areas with high levels of TCE, PCE, and chromium contamination (50 µg/L or greater) to areas of lower levels or no contamination. Furthermore, FFS modeling results indicate that if LADWP's North-Hollywood-area production well fields are pumped at maximum rates for an extended period, the NHOU extraction wells will not be able to contain the high-concentration contaminant plumes. In response to these issues, EPA conducted the NHOU FFS and plans to issue a new remedy decision in 2009 to enhance plume capture and add treatment for chromium.

Opportunities for Optimization

USEPA has been identifying opportunities for optimization by initiating a FFS for evaluating remedial alternatives and by conducting a chromium evaluation study.

Selection and implementation of the second interim remedy is intended to address the continued presence of significant VOC contamination in groundwater, as well as the need for treatment of chromium and other emerging contaminants.

7.1.3 Burbank Operable Unit

Remedial Action Performance

All remedial actions pertaining to groundwater, as mandated in the 1989 ROD, 1991 ESD#1, and 1997 ESD#2, have been implemented. The BOU groundwater treatment facility has provided water at the point of delivery that was below MCLs for all COCs and has achieved

the treated water quality requirements specified in ESD #1 since startup in 1996. Generally, the BOU groundwater treatment facility has met the substantive requirements of the DHS, NPDES, and SCAQMD permits.

The BOU system effectively limited contaminant migration and treated groundwater contamination to acceptable levels during the review period except (1) during a six-week period of entire plant shut-down following a fire at the treatment plant, (2) during a five-month period in 2008 (February through August) when it operated at half capacity during planned maintenance modifications. The system has been repaired and maintenance issues are being addressed to prevent similar shutdowns in the future.

Operations and Maintenance

Although operational loss in efficiency has been reported during this review period as a result of O&M problems, including LPGAC bed change outs (1,2,3-TCP breakthrough), VPGAC screen replacement, and modified extraction well pumping (due to high concentrations of chromium), the objectives of the interim remedy, which include partial VOC plume containment, VOC mass removal, and treatment of extracted groundwater to concentrations less than the respective MCLs, have been achieved.

Opportunities for Optimization

The VPGAC modification project has recently been completed, so the City is reinitiating an optimization project that will evaluate ways to optimize the O&M of the BOU treatment facility. Other than this planned optimization, there are no other identified opportunities for optimization.

7.1.4 Institutional Controls for BHOU and NHOU

There are no specifically tailored institutional control (IC) instruments in place within Area 1. However, the governmental controls in place at the site are effective in preventing exposure to contaminated groundwater. EPA is working with the City of Los Angeles to augment the existing governmental controls with a groundwater resources management plan to ensure that groundwater extraction from municipal well fields does not interfere with the plume containment achieved by the NHOU remedy. The primary governmental control is the 1979 Final Judgment in *Los Angeles v. San Fernando*, (Superior Court Case No. 650079) in the case titled *Los Angeles v. San Fernando (LA v. San Fernando)*. The 1979 final judgment in *LA v. San Fernando* upheld the Pueblo Right of the City of Los Angeles, to all groundwater in the ULARA Basin from precipitation within the ULARA and all surface and groundwater flows from the Sylmar and Verdugo Basins. 14 Cal. 3d 199 (1975). *LA v. San Fernando* also established the water rights of the cities of Los Angeles, Glendale and Burbank to all water imported from outside the Basin and either spread or delivered within the Basin. The Final Judgment created the entity known as "Watermaster" with full authority to administer the adjudication, under the auspices of the Superior Court.

Under the final judgment in *LA v. San Fernando*, with the exception of certain minor historical water rights holders, only the cities of Los Angeles, Burbank and Glendale are permitted to extract groundwater from the Basin. Each of these municipalities administers a public water system, which is regulated by the California Department of Public Health.

Governmental controls on the use of groundwater as drinking water include EPA- and State of California-promulgated maximum contaminant levels ("MCLs") and California State Action Levels that require drinking water standards to be met before delivery of the treated water to the potable water supply. These drinking water controls and the Watermaster's authority to regulate and allocate water resources eliminate unregulated use of area groundwater; therefore, the interim remedy is currently protective of human health.

7.2 Question B: Are the exposure assumptions, toxicity data, cleanup levels and remedial action objectives used at the time of the remedy selection still valid?

A review of the existing ARARs indicates that there have been no significant changes or updates that would impact the protectiveness of the remedy.

There were two exposure assumptions used in the Baseline Risk Assessment completed in 1989 for the Burbank OU ROD:

- Potential ingestion exposure of untreated groundwater if used for drinking water, and
- Potential inhalation exposure to air emissions from the proposed air stripper at the treatment facility.

There has been no change to the exposure assumptions.

There have been a number of changes to the toxicity values for specific constituents of concern in groundwater since the Baseline Risk Assessment was completed. Since then, EPA initiated a re-assessment of PCE and TCE toxicity; these assessments are currently under review. In the interim, EPA is using toxicity values developed by Cal/EPA because they meet the criteria outlined in Superfund's policy on provisional peer-reviewed toxicity values. The Cal/EPA toxicity value is reflected in EPA's 2008 Regional Screening Level (RSL) table. The RSL table was developed using the latest toxicity values, default exposure assumptions and physical and chemical properties and is consistent with the OSWER chemical toxicity hierarchy. For PCE, the RSL table has a tap water screening level of 0.11 µg/L. This corresponds to an increased cancer risk of one in one million. The PCE concentration equivalent to the upper end of EPA's risk range (one in ten thousand excess lifetime cancers) would be 11 µg/L. The Federal MCL for PCE remains 5 µg/L, which is within EPA's risk range. The same is true for TCE, for which the ROD selected the State Action Level of 4 µg/L and the concentrations at either end of EPA's risk range using the Cal/EPA toxicity values are 1.7 µg/L to 170 µg/L.

The 1989 Baseline Risk Assessment analyzed risk for various volatile organic compounds. Since then, several new contaminants have been detected at North Hollywood and Burbank groundwater. Most notably is the hexavalent chromium found at the Honeywell site and at NHOU remedy extraction well, NHE-2. The current Federal MCL for total chromium is 100 ppb and the current State MCL is 50 ppb. The 2008 Regional Screening Level (RSL) table relies on EPA's IRIS toxicity information to set a screening level for tap water at 110 ppb based on a non cancer risk from ingestion. However, since there is no exposure to untreated

water, these changes do not affect the protectiveness of the remedy. At the BOU and NHOU treatment facilities, the chromium concentrations at the combined plant effluent are 5 ppb (BOU) and 30 ppb (NHOU) or lower, which are well below EPA's hazard risk.

7.3 Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

7.3.1 North Hollywood Operable Unit

Groundwater elevations have declined significantly in response to LADWP's use of large capacity water-supply well fields that were installed in the vicinity of the NHOU after the NHOU remedy began operating. This has resulted in plume migration in the NHOU.

Chromium concentrations in samples collected from the Honeywell facility monitoring wells suggest that there is a significant source of chromium at the Honeywell site. During the current five-year review period, total and hexavalent chromium concentrations greater than 10,000 $\mu\text{g}/\text{L}$ were detected at several of Honeywell's onsite monitoring wells upgradient from NHOU extraction well NHE-2. Under an order issued by the RWQCB, Honeywell is constructing an in-situ chromium treatment system, which is expected to begin operating in fall 2008.

Emerging contaminants (specifically 1,2,3-TCP and 1,4-dioxane) appear to be limited in lateral extent and concentrations in the NHOU; however, they are mobile and persistent. Concentrations of some of these emerging contaminants have exceeded CDPH notification levels at a limited number of monitoring locations and at NHOU extraction well NHE-2.

7.3.2 Burbank Operable Unit

The BOU has achieved partial control of the movement and spread of groundwater contaminants in the BOU area, while contributing to aquifer restoration in Area 1.

Emerging contaminants are present in BOU extraction wells at concentrations greater than MCLs or notification levels including total chromium and 1,2,3-TCP. Hexavalent chromium is also present in the BOU groundwater. The BOU treatment system is currently meeting the City of Burbank's voluntary limit for hexavalent chromium in drinking water that is served to the public of 5 parts per billion, and the notification level for 1,2,3-TCP.

7.4 Technical Assessment Summary

According to the data reviewed, the site inspection, and the interviews, the remedy for the NHOU is not functioning as intended by the 1987 ROD. Although the existing extraction and treatment system is decreasing TCE and PCE concentrations in water to below MCLs and has removed significant VOC mass from the NHOU, migration of VOCs has demonstrated that the VOC plume is not being adequately contained. In addition, elevated concentrations of chromium resulted in an extended shutdown of extraction well NHE-2 that serves an important plume containment function. EPA is conducting a focused feasibility study and plans a decision on a new remedy in 2009 to enhance plume capture and add chromium treatment.

According to the data reviewed, the site inspection, and the interviews, the remedy for the BOU is functioning as intended by the ROD. The lower than expected extracted volumes at the BOU are currently being evaluated and addressed by the City of Burbank and EPA. There have been no significant changes in the toxicity factors of the COCs that were used in the baseline risk assessment. The presence of emerging contaminants, including total chromium, hexavalent chromium, 1,2,3-TCP, and 1,4-dioxane, are not currently affecting the protectiveness of the remedy.

8.0 Issues and Recommendations

Issues identified during the five-year review process for the NHO and the BO are presented in Table 8-1. The table provides recommendations for improvement at each OU and identifies the lead entity and milestone dates for implementation of the recommendations.

TABLE 8-1
ISSUES AND RECOMMENDATIONS FOR AREA 1
San Fernando Valley (Area 1) Superfund Site, Los Angeles County, California

Operable Unit	Issue	Recommendations and Follow-up Actions	Lead	Milestone Date	Affects Protectiveness (Y/N)	
					Current	Future
NHO	Some groundwater migration from areas with high levels of COCs to areas of lower levels or no contamination has occurred.	Complete FFS and select remedy improvements that will achieve more effective plume containment.	EPA	2009	N	Y
NHO	The treatment facility at NHO cannot treat chromium, which has affected operation of at least one NHO remedy extraction well	Complete FFS and select remedy improvements that include chromium treatment as needed to assure treated water meets drinking water requirements.	EPA	2009	N	Y

9.0 Protectiveness Statement

The remedy for the NHOU is protective of human health and the environment in the short-term because there is no exposure to untreated groundwater. The treatment system effluent contaminant concentrations are less than their regulatory cleanup goals. There are governmental controls in place that prevent exposure to untreated groundwater. However, to be protective in the long term, the treatment facility needs to be modified to treat chromium and the extraction system needs modifications to improve plume containment. EPA is completing a focused feasibility study to evaluate options for expanding and improving the performance of the NHOU remedy and expects to propose and later select a second interim remedy in 2009 that will enhance plume capture and add chromium treatment.

The remedy at BOU is protective of human health and the environment because there is no exposure to untreated groundwater. The treatment system effluent contaminant concentrations are less than their regulatory cleanup goals. There are governmental controls in place that prevent exposure to untreated groundwater. The current extraction system is achieving the remedial action objective of partial containment.

10.0 Next Review

The next comprehensive five-year review for Area 1 (BOU and NHOU) will be completed on or before September 2013.